ACCESSION #: 9604240012

LICENSEE EVENT REPORT (LER)

FACILITY NAME: Surry Power Station, Units 1 and 2 PAGE: 1 OF 6

DOCKET NUMBER: 05000280

TITLE: Unit 1 Reactor Trip/Turbine Trip Due to Deluge Actuation on the "A" Main Transformer & Unit 2 Manual Reactor Trip Due to Erratic IRPI Indications

EVENT DATE: 05/22/90 LER #: 90-004-00 REPORT DATE: 06/21/90

OTHER FACILITIES INVOLVED: DOCKET NO: 05000

OPERATING MODE: N POWER LEVEL: 100

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR SECTION: 50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:
NAME: M. R. Kansler, Station Manager TELEPHONE: (804) 357-3184

COMPONENT FAILURE DESCRIPTION:

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	
X		INS	W120	
X		LAR	W120	

REPORTABLE NPRDS: N
N

SUPPLEMENTAL REPORT EXPECTED: NO

ABSTRACT:

On May 22, 1990 at 1150 hours with Units 1 and 2 at 100% power, a fault occurred on the Unit 1 "A" main transformer as a result of an inadvertent actuation of the transformer's deluge system. The fault initiated a Unit 1 generator differential lockout which immediately initiated a turbine trip/reactor trip. The fault also resulted in the lockout of the "A" Reserve Station Service Transformer RSST). Approximately 10 seconds later, the Unit 2 control room operator initiated a manual reactor trip after observing erratic control rod Individual Rod Position Indications (IRPI). Operators performed the appropriate plant procedures and quickly stabilized the units following the trips. The erratic Unit 2 IRPI indications were due to voltage transients that occurred an both units' emergency buses which were caused by the Unit 1 generator trip, the "A" RSST lockout, and subsequent motor starts. The #3 Emergency Diesel Generator automatically restored power to the Unit 1 "J" emergency bus which was de-energized by the "A" RSST lockout. A four hour non-emergency report was made to the Nuclear Regulatory Commission in accordance with 10CFR50.72.

END OF ABSTRACT

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1.0 Description of the Event

On May 22, 1990 at 1150 hours with Units 1 and 2 at 100% power, a fault occurred on the Unit 1 "A" main transformer as a result of an inadvertent actuation of the transformer's deluge system. The fault initiated a Unit 1 generator (EIIS-GEN,TB) differential lockout which immediately initiated a turbine trip/reactor trip. Approximately 10 seconds later, the Unit 2 control room operator

initiated a manual reactor trip after observing erratic control rod Individual Rod Position Indications (IRPI) (EIIS-2I,AA).

Approximately two minutes prior to the trips, control room annunciators alerted control room operators of the actuation of the "A" main transformer deluge system (EIIS-KP). Plant operators wars dispatched to the transformer and verified that no fire existed and initiated isolation of the deluge system. As plant operators were isolating the deluge, arcing was observed from the "A" main transformer to the generator output isophase bus duct and to the "A" Reserve Station Service Transformer (RSST) (EIIS-XFMR) bus bars. In addition to the generator differential lockout, the arcing initiated a lockout of the "A" RSST, which coupled with the Unit 1 generator trip, resulted ia de-energizing the Unit 1 "A" Station Service (SS) (EIIS-EA) bus and the Unit 1 "J" 4160V emergency bus (EIIS-EK). The #3 Emergency Diesel Generator (EDG) (EIIS-GEN,EK) automatically started and restored power to the Unit 1 "J" bus within seconds of the "A" RSST lockout. Major equipment supplied by the Unit 1 "A" SS bus includes the "A" Reactor Coolant Pump (EIIS-P,AB), the "A" Main Feedwater Pump (EIIS-P,SJ) and the "A" Condensate Pump (EIIS-P-KD). The "C" condensate pump automatically started when the "A" condensate pump was de-energized.

Following the initiation of the manual Unit 2 reactor trip, a Unit 2 generator trip occurred as designed 24 seconds later. The "A" RSST also supplies the Unit 2 "A" SS bus when the unit generator is off line. Consequently, the lockout of the "A" RSST, coupled

with the Unit 2 generator trip, resulted in de-energizing the Unit 2 "A" SS bus. Major equipment supplied f-rom this bus, including the Unit 2 "A" Reactor Coolant Pump and Unit 2 "A" Main Feedwater Pump was de-energized. A load shedding scheme designed to shed various loads from both Units' SS buses to maintain voltage on the RSS buses was initiated. This resulted in tripping the second Unit 1 Main Feedwater Pump terminating Unit 1 main feedwatar flow. However. the auxiliary feed pumps had started as designed on low Steam Generator (S/G) levels prior to the tripping of the second main feedwater pump and provided sufficient feedwater to the steam generators to recover level.

Following the trip, safety systems on both units functioned as designed, and both units were stabilized. A four hour non-emergency report was made to the Nuclear Regulatory Commission in accordance with 10CFR50.72.

2.0 Safety Consequences and Implications

During the event, the turbine protection and reactor protection systems for both units functioned as designed. The #3 Emergency Diesel Generator automatically started and loaded onto the Unit 1 "J" Emergency Bus as designed to restore power to the bus. The loss of all Main Feedwater on Unit 1 was not significant as the Auxiliary Feedwater Pumps started and provided adequate feedwater flow to the steam generators co maintain a heat sink for the reactor. The two remaining Reactor Coolant Pumps on each unit continued to operate to provide forced flow through the reactor and maintain the reactor in a hot shutdown condition. There are no safety consequences associated with the de-energization of each units' "A" Station Service Bus since equipment powered from these buses are not required to ensure safe reactor shutdown or to mitigate the

consequences of an accident. Therefore, the health and safety of the public were not affected.

3.0 Cause

The arcing which occurred on the Unit 1 main transformer has been attributed to the actuation of the "A" main deluge system which contained corrosion product contaminants. The distance between the "A" RSST bus bars and the "A" Main Transformer 230KV leads is in conformance with electrical codes and standards. However, the proximity of these conductors is believed to have been a contributing factor to the loss of the "A" RSST.

Approximately 20 to 30 minutes prior to the actuation of the transformer deluge system, a construction employee inadvertently bumped the weather enclosure cabinet for the Unit 1 transformers' deluge manual pull stations. The employee verified the pull station had not actuated immediately after he bumped the cabinet. However, following the event, the manual pull station was discovered in the actuated position. The pull stations are maintained in the de-actuated position by a glass rod which holds the pull lever in the upright position. The pull station is actuated by pulling down the lever which breaks the glass. The pull station will also fail to the actuated position if the glass fails. It is surmised that the glass failed, and the pull station actuated 20 to 30 minutes alter the enclosure was bumped.

The Unit 2 IRPIs are powered from the Unit 2 semi-vital bus, which in turn was powered from the Unit 2 "J" emergency bus. The transformer that supplies power to the IRPIs is designed to maintain its output voltage with +/- 0.5% when the input voltage is within +/- 10%. Following the Unit 1 trip, a voltage transient occurred on both units emergency buses due to the fault and subsequent large motor starts. The voltage transient on the Unit 2 "J" emergency bus exceeded the +/- 10%. This was sufficient to cause significant fluctuations in the IRPIs which prompted the Unit 2 operator to trip the Unit 2 reactor. (Refer to Attachment 1 for breaker positions.)

4.0 Immediate Corrective Action(s)

Operators followed appropriate plant procedures to quickly stabilize the units following the respective reactor trips. Also, the Shift Technical Advisor

monitored the critical safety function status trees to ensure specific plant parameters were noted and that those parameters remained within safe bounds.

5.0 Additional Corrective Action(s)

All main and station service transformer deluge systems were flowed in accordance with periodic test procedures.

The fire protection manual pull stations for the Unit 1 and Unit 2 transformers have been replaced with pull stations which are less susceptible to inadvertent actuation.

The "A" Main Transformer was inspected following the trip and no preexisting conditions which could have caused the arcing were

found.

The High Voltage bushing on the output an the Unit 1 "A" Main Transformer, which was damaged by the arcing, has been replaced.

A lightning arrestor on the "A" RSST damaged by the arcing has been replaced. In addition, slight damage to the 4160V bus bars from the "A" RSST was repaired.

6.0 Action(s) Taken to Prevent Recurrence

In addition to the corrective actions described above, evaluations of enhancements to the IRPI system and its power supply are being conducted. An evaluation will be performed to determine the feasibility of enhancing the separation between the "A" Main Transformer and the "A" Reserve Station Service bus bars. In the interim, the deluge system to the "A" Main Transformer has been isolated based on engineering guidance, and an evaluation of the deluge system is being conducted.

7.0 Similar Events

LER 1-89-44: "Manual Reactor Trip/Turbine Trip Initiated Following Loss of Power to Semi-Vital Bus caused by a Fault on "A" RSST". This event occurred due to roofing material blowing off the turbine building roof and faulting the "A" RSST.

8.0 Manufacturer/Model Number(s)

General Electric Single Phase, 60 cycle, Class FOA (Manual GEK-16412).

Moloney LTC (Load Tap Changer) Transformer, Type MA, Design X-760.

Figure 1 "Breaker Position Prior To Event" omitted.

Figure 2 "Breaker Position After Event U1 and U2 Generator Output Breakers Open" omitted.

VIRGINIA ELECTRIC AND POWER COMPANY
Surry Power Station
P. O. Box 315
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June 21, 1990

U. S. Nuclear Regulatory Commission
Document Control Desk
Washington, D.C. 20555

Serial No.: 90-377
Docket No.: 50-280
50-281
License No.: DPR-32
DPR-37

Gentlemen:

Pursuant to Surry Power Station Technical Specifications, Virginia

Electric and Power Company hereby submits the following Licensee Event Report for Units 1 and 2.

REPORT NUMBER

90-004-00

This report has been reviewed by the Station Nuclear Safety and operating Committee and will be reviewed by Corporate Nuclear Safety.

Very truly yours,

M. R. Kansler
Station Manager

Enclosure

cc: Regional Administrator
Suite 2900
101 Marietta Street, NW
Atlanta, Georgia 30323

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